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The 2006 conference on Electronic Voting took place in Castle Hofen near Bregenz at the wonderful Lake Constance from 2nd to 4th of August. This volume contains the twenty papers selected for the presentation at the conference out of more than forty submissions. To assure scientific quality, the selection was based on a strict and anonymous review process. The papers cover the following subjects: e-voting experiences, social, legal, political, democratic and security issues of e-voting, as well as solutions on how to (re)design election workflows, and finally how to implement and observe electronic voting systems.



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Lecture Notes in Informatics

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Proceedings



Transition to electronic voting and citizen participation

Letizia Caporusso, Carlo Buzzi, Giolo Fele, Pierangelo Peri, Francesca Sartori

Dipartimento di Sociologia e Ricerca Sociale
Università degli Studi di Trento
V. Verdi, 26
38100 Trento, ITALY
provote@soc.unitn.it

Abstract: This paper draws attention to the need of a systematic socio-technical approach to introducing electronic voting and presents early results from a pilot project conducted by the Provincia Autonoma di Trento, Italy. Main features of this experience are the constant monitoring of the social impact and the development of a technological solution in accordance to the suggestions provided by the users themselves. We recommend that no sudden switch to a new form of ballot should be imposed on electors but rather that research is to be fostered in order to uncover and preserve the traditional and symbolic connotations embedded in the act of voting.

1 Introduction

At the time being, the Italian ballot system consists of a paper-and-pencil method and electors are allowed to vote only in the section where they are registered. The vote is expressed by drawing a cross on the symbol of the party and by – eventually – writing down the names of the candidates. During the count contentions do arise, among other reasons, due to the misinterpretation of ballots that are not clearly written or ballots that seem to have been purposely marked in order to be recognized. Citizens who are physically impaired have their vote cast by a person they trust, as no technological support is available to help them vote on their own.

In order to overcome these obstacles as well as to keep the democratic process aligned with the development of e-society, new forms of voting are being considered by the Provincia di Trento which, because of historical and political reasons, benefits from special autonomy status in respect to other Italian areas and can determine by its own legislation how the Council and the President of the province are elected. Such a peculiar condition is favouring a boost in the development of e-government, including a thorough study of the possibility to introduce e-vote for local elections: this project, named ProVotE, was set up since December 2004 and aims at crafting a voting machine that, complying with the standards indicated by the Venice Commission [Ve04], is accepted and easily employable by electors regardless of their age, sex, education and confidence in the use of technology.

2 A systematic approach

ProVotE is characterized by an on-going round-table¹ where representatives of the Provincial Electoral Bureau, researchers from the Centre for Scientific and Technological Research (IRST) and from the Department of Sociology and Social Research of the Università di Trento meet on a regular basis to share developments in each area of expertise and plan systemic activities aimed at testing electors' reactions to a likely, but yet to establish, switch from paper-and-pencil to electronic voting. In the light of the key role played by the study of the social impact, we designed a set of investigations spread over one year in order to get the clearest picture of citizens' beliefs and attitudes toward e-voting before and after the two field tests that took place in May and November 2005.

We define social impact as any change occurring in the symbolic order or in the concrete behaviour of a population in consequence of the exposure to an external stimulus. In investigating the social impact of the introduction of electronic voting we had to consider people's attitudes, expectations, fears and practices *before* they even heard of the possibility of e-voting in their own area, *during* the field tests and some time *after* these trials. The research plan included:

- 8 preliminary focus groups to explore practices and habits related to voting;
- over 2500 telephone interviews to uncover attitudes toward electronic voting and assess the technological ability of the population;
- 160 supervised trials aimed at investigating man-machine interaction by means of both questionnaires and ethnographic observation;
- monitoring of turnout to open trials held in the towns chosen for the first field test;
- a large scale field test in five towns alongside local elections – involving 6950 participants – and a smaller scale follow-up field test with 336 electronic voters;
- analysis of electoral data and comparison of electronic and paper-and-pencil results;
- 1200 telephone interviews four months after the tests to compare attitudes and motivations of those who tried electronic voting and those who did not.

This paper offers a brief account of the main empirical results of the research activities summarised above and underlines the importance of integrating the technological with a sociological perspective, which considers the feedback provided by the end users of electronic voting systems.

¹ The authors acknowledge the support received by the Provincia Autonoma di Trento, especially by the Director of the Electoral Bureau, Patrizia Gentile. We wish to thank Adolfo Villafiorita (IRST) who coordinated the technological team and Giorgia Fasanelli (CRC Trentino). As with any large project the results presented in this paper are based on the joint work of several people: Andrea Cossu, Lodovica Simionato, Elisa Fanelli analysed qualitative data; Enzo Loner, Cristina Margheri, Michela Frontini analysed surveys.

3 Transition to electronic voting and citizen participation

3.1 The sense of voting and the practices related to elections

The socio-anthropological literature describes the activities associated with elections as *rituals* which enhance the sense of belonging to a civic community [Ed64; Ke88]. Little has been said, however, about the intrinsic value and significance of the act of voting from a subjective standpoint: the *sense* of “having one’s say”, as well as the *body of practices* related to the expression of the citizens’ will, appears to have been widely neglected. A preliminary “qualitative” study was therefore aimed at unveiling the entangled mixture of symbolic and material elements that come into play in the apparently ordinary act of casting a vote.

The focus groups portrayed a rather customary and standardized schedule of the day of elections: people show preferences about the time of day devoted to voting (i.e. early in the morning or late at night to fit with Sunday outings, rather than just before or just after Holy Mass); which might result in queues and a potential intolerance towards any innovation, should it imply a longer time to mark the ballots. The habit of going to vote together with relatives also appears to be rather widespread, in the main if going to the polling station requires a means of transport: the presence of younger people in family groups going together to cast their ballots might then be crucial to reinforce institutional tuition and to bridge the technological gap between generations, should electronic voting be extensively introduced.

More considerations pertain electors’ awareness of their ability to vote “properly”: whereas paper ballot is considered an easy, automatic act in which the chance of making mistakes is minimal, the idea of voting electronically evokes more perplexities. The perceived social impact can be summarised in the following key issues, which need to be taken into careful consideration, as beliefs often anticipate or even modify the course of future events:

- a. interviewees believe that e-voting will have no effect in increasing the turn-out
- b. interviewees fear that costs for elections will increase, compared to paper ballots
- c. interviewees project their worries onto a specific segment of population (senior citizens) and fear that this social group might be, though indirectly, deprived of the right to vote
- d. interviewees reckon age will impact more than educational capital or technological ability
- e. a general distrust in politics and a feeling of uselessness of one’s vote are often expressed, which, according to the interviewees, might result in an apathetic or critical attitude toward innovations in such a delicate matter.

Nonetheless, the informants (especially the youngest) also brought evidence of some hindrance experienced in the choice of candidates with the paper-and-pencil method: this requires to write down the names properly and correctly to avoid having the vote invalidated, which gives rise to frequent undervoting.

Some practices related to paper voting emerged, such as the frequent use of facsimiles, which are mailed by candidates and show how to fill in the ballot. In the light of such a habit, keeping the visual layout of the touchscreen consistent to that reproduced on paper does not require a major change in the electors' expectations and is welcomed by all interviewees.

A surprising result of this preliminary investigation relates to the citizens' opinion about the use of a printer that allows electors to verify their ballot [e.g. Me02]: unexpectedly, they seem to consider it an unnecessary token which does not fit with the idea they have of "electronic" voting. They argue that the cost of printing and counting ballot proofs will equal or exceed the expense of traditional ballots without suggesting the same feeling of control and trust that the paper offers.

At the same time it is important to stress that the confidence of electors in the traditional procedure is also influenced by the fact that anyone has the chance to be a scrutinizer or a list representative and therefore to be protagonist and witness of the entire process: the switch from material to "immaterial" practices seems to deprive the community of the direct contact with the ballots.

By interviewing the scrutinizers, further evidence related to the need of trust also emerged:

- a. trusting that one's ballot is personal and secret (thus guaranteeing one's freedom of choice)
- b. trusting that each and every vote is actually counted (i.e., not "thrown away")
- c. trusting that the ballot count truly respects the voter's will (also by being available for further controls and re-counts)

The board of scrutinizers appears to be a peculiar kind of organization, in the sense that it is formed and disbanded on the same day of elections: it learns to optimize time and procedures while already in action and often shows more flexibility and discretionary power than it'd be strictly allowed by norms and legislation, in order to prevent mistakes due to fatigue or lack of attention. Its "professional culture" is easy to acquire and available to almost anyone: the practices related to casting a ballot become, in the course of election day, a well-oiled "machine". When this voting machine works, be it paper-based or electronic, it should become sort of invisible: its efficiency and its acceptance by the citizenry is signified by its *disappearance* in the sense that it becomes a *routine* taken for granted, and not an "issue".

At present, the complex and time-consuming bureaucratic procedures related to data management are described as cumbersome and old-fashioned: a simplification of the procedures related to electors identification, ballots count and register filling would definitely be welcome.

Above all, both scrutinizers and citizens explicitly and implicitly stress the need for adequate information: switching to electronic voting implies a significant change in a long established and framed routine. A new habit has to be created from scratch and it cannot be learned “by trial and error” as one might find acceptable in other technological settings. To smooth the transition to e-voting this preliminary study suggested that:

- the touchscreen should show some continuity with the paper ballot to reduce the need for cognitive re-adaptation;
- appropriate instruction should be ensured to both electors and scrutinizers: their confidence with the new system can be enhanced by open trials;
- special consideration should be granted to senior citizens: the care that institutions show towards this group will be reflected in the appraisals of many others.

3.2 Are we ready to vote electronically? Attitudes and technical skills

Alongside the “qualitative” investigation, a preliminary “quantitative” survey was carried out by means of telephone interviewing to assess the interest of the population in changing the voting procedures. The sample (2561 respondents) was representative of the adult population of Trentino, controlling for age, sex and geographical distribution. The aim of this study was to consider attitudes towards electronic voting as well as practical technological ability. The latter was measured by an index created on the basis of statements related to the use of common electronic appliances requiring skills similar to those needed for e-voting. Approximately 10% of the respondents turned out to be barely familiar with technology and a further 6% to be very unacquainted with menu-like procedures. Those who might be impaired in the use of electronic means are mostly elderly people, retired, with no or very little education. The attitudes toward electronic voting, or rather, to whatever the respondents thought electronic voting to be (as they had never experienced it in elections), are summarised in Figure 1.

<i>How much do you agree with the following sentences?</i>	<i>%</i>
• Voting procedures should inevitably be changed, sooner or later	70,3
• Electronic voting is a good idea, but I believe it'd be difficult to implement	58,2
• Electronic voting might eliminate contentions in interpreting voters' will	55,9
• Electronic voting might increase abstentions	54,4
• Electronic voting might lower the mistakes that today cause ballots to be invalidated	53,2
• Electronic voting is a dangerous solution as it'd be prone to vote tallying that can't be easily demonstrated	42,0
• With electronic voting there'd be no tangible proof of my vote	36,5
• Electronic voting wouldn't fully guarantee that the ballot is secret	36,1
• People are ready to switch to electronic voting	28,2
• I don't trust technology and therefore I don't trust electronic voting	27,9

Figure 1: Attitudes toward electronic voting (% of answers “agree” and “strongly agree”, n=2561)

These attitudes confirm some of the beliefs already found via the focus groups, such as the fear that some segments of the population might not be ready to vote electronically, thus increasing abstentions; the desire that certain common mistakes and controversies will be eliminated and a feeling of the inevitability of change. However, citizens are on the whole in favour of voting electronically even in the near future, as Figure 2 shows. It's mainly professionals, students, educated people approximately below 50 years of age who are enthusiastic about e-voting (more than 65% are in favour), whereas elderly, retired citizens with no education show very little interest (less than 40% are in favour).

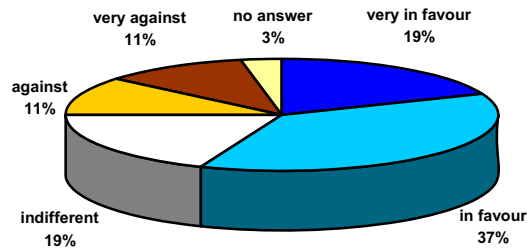


Figure 2: “Should electronic voting be adopted for the next provincial elections, would you be in favour or against this idea?” (% , n=2561)

The voters’ openness toward voting electronically in the next elections appears to be more related to their attitudes than to specific socio-demographic characteristics: sex, social class, education and even age have little or no impact on the will to use an electronic ballot, when technological ability and attitudes are controlled for. Young people are more inclined to technology but seem to be little interested in politics; on the other hand, senior citizens are less confident with electronic methods but are very motivated towards participating in elections, as they feel it to be a duty, not just a right. Education level has a limited direct impact on the will to vote electronically: only those who received no education, controlling for age and technological ability, are significantly less in favour. The size and the level of development of a town also have, perhaps unexpectedly, almost no influence: this indicates that smaller, rural and peripheral locations are likely to accept a switch to electronic voting at the same pace as urban areas, despite being conditioned by more “traditionalism”. What really determines the acceptance of electronic voting is the image of the strengths and pitfalls of the system: trusting or distrusting this unknown and never experienced means being the most powerful incitement or deterrent.

The quantitative preliminary study also suggested that:

- citizens are generally in favour of adopting electronic voting and their expectations are mostly positive, though some doubts remain and should be cleared before this new method is adopted;
- the fear of not being ready for the change is challenged by the widespread use of electronic appliances that require skills similar to those necessary to vote electronically;
- for a campaign to introduce e-voting to be successful, it should stress the benefits and assure electors that safety is guaranteed;
- voting machines should be adapted to the electors’ needs (rather than expecting electors to adapt to voting machines) and citizens should be aware of this effort.

Once a prototype of the voting machine was ready, trials and simulations were organized in the five towns chosen for the first large-scale field test scheduled to be performed during local elections. To try the electronic ballot with the most disadvantaged social group, a sample of 80 senior citizens was randomly chosen from the registries, ensuring that their educational level was very low or null; a reference group of further 80 young and middle-aged people was also invited to the tests, on condition that they possessed at most a high school diploma. Participants in the simulation filled in a questionnaire before and after the trials and were video-recorded during the test. As a result:

- the visual layout of the screen, i.e. the position of “buttons” and the size of characters was modified
- the choice of preferences and, generally speaking, man-machine interaction, were optimized by observing how people “naturally” tend to cast a vote by means of a touchscreen.

The flyer with instructions for the correct use of the new form of ballot were also submitted to non-experts for concept-testing via focus-groups and in-depth interviewing.

This complex but continuous exchange between the efforts of the technological team, the law standards required and guaranteed by the electoral bureau and the contribution of citizens themselves helped to develop a low-impact system which was ready to be put to trial in May 2005.

4 Trialling electronic voting: evaluation of the social impact

On May the 8th, 2005, elections took place throughout the province of Trento to choose town mayors and councillors: this turned out to be an excellent occasion to try on a large scale the electronic voting system that had been developed. Such an opportunity had no legal value, as electors were invited to test the new form of ballot after they cast the paper one, which remained the only valid one. The 7782 electors of the five towns chosen² for the field test received a letter of invitation and instructions: about 74% went to the polling station and cast the traditional paper-and-pencil ballot; of those, an average of 59% (with a peak of up to 80% in one of the smallest towns) tested the electronic system, too, and were asked to answer a questionnaire after completing the trial.

On the whole the participants were very satisfied with the system (Figure 3) although some problems were reported, especially in choosing councillors, in modifying a wrong choice, and in being sure that the procedure was terminated.

² according to a criterion based on their size and geographical location

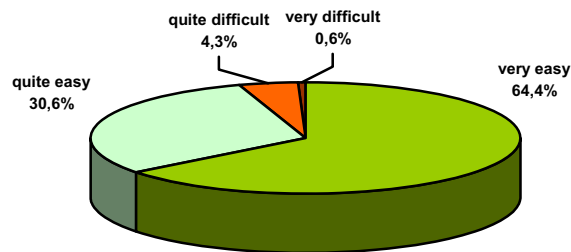


Figure 3: “How do you evaluate this new system of voting?” (% , n=5534)

Those who tested the electronic booth are a self-selected sample and it is reasonable to suppose that people who are very against e-voting were not among them. Nevertheless, the impression the participants got is altogether positive: 61% would be very favourable to voting only electronically already in the next provincial elections and only 10% would be very or quite against it, which is a remarkable result compared to that obtained before the field test took place (see Figure 2). The effect of exposure to different media on the perceived friendliness of the e-voting system was also considered and useful advice were taken up for the calibration of future communication campaigns. Last but not least, this field test revealed the importance of what we labelled as “scrutinizers effect”, that is, the key role played by people at the polling station in reassuring and supporting electors, which leads to a higher turn-out in the electronic booth and a lower number of perceived impediments.

A second trial, on a much smaller scale, took place in November 2005 on the occasion of another round of local elections and provided a useful assessment of the modifications made to the system. Interestingly, in the town where this field test took place voter turn-out resulted in one of the highest in a ten years span, thus suggesting that electronic voting and the communication campaign that preceded it caused some kind of “Hawthorne effect” stimulating the citizens’ curiosity and interest in elections. 89% of those who cast their ballot repeated their vote electronically (vs. 59% in May): though the absolute numbers of citizens involved in the two tests are very different (336 in November and 6950 in May), it is quite clear that greater attention to communication and to motivating scrutinizers significantly increases the voters’ will to try electronic voting.

Voters' subjective evaluation of the system was extremely positive: none judged it to be very difficult to use and only 2% described it as "quite difficult" (compare with Figure 3). Electors who experienced some kind of trouble while testing the system relied on the assistance of scrutinizers whose support from outside the voting booth helped them overcome difficulties and resulted in a positive evaluation of the trial³. As with the first test, the respondents are a self-selected sample, which leads to an optimistic bias, but such a positive result indicates that the experience of using the touchscreen proved to be much easier than the image of it (as portrayed in Chart 2). The technical effort in improving the way councillors are chosen also abated the perceived hindrance in performing this operation, thus highlighting the importance of repeated tests and trials in "real world" settings to optimize the system according to actual voter-machine modes of interaction.

At present further studies are being carried out to test for the statistical significance of the trials on turn-out and on the vote cast, though from a strictly descriptive viewpoint electronic voting appears not to have impinged on attendance and the ballots electronically recorded are consistent with the paper ones, having legal standing.

5 Recalling memories: capitalising on the effects produced by the trials

A *post hoc* telephone survey on a sample of the citizens potentially involved in the first field test allowed us to further evaluate the social impact of the introduction of e-voting: recalling the memory of the elections some months after they took place helps to understand how much of this experience "remained". These follow-up interviews were aimed at monitoring the exposure to an array of media forms used during the communication campaign and to verify their effect on the decision of participating in the test. They also provided a useful assessment of the perceived trust in electronic voting: as Figure 4 shows, interviewees are altogether slightly more favourable to e-voting with respect to the first telephone interview (compare with Figure 2) and those who tried the electronic booth first hand are definitely very satisfied. Results for those who watched others e-voting are also reported, as well as the attitude of the citizens who declared not to have voted at all.

	sample	testers	watchers	non-voters
very in favour	21%	32%	12%	9%
in favour	41%	49%	39%	28%
indifferent	17%	8%	20%	36%
against	14%	9%	19%	12%
very against	7%	2%	10%	14%
<i>N</i>	1206	503	372	146

Figure 4: "Should electronic voting be adopted for the next provincial elections, would you be in favour or against this?"

³ 61% of the interviewees answered to be *very in favour*, 26% to be *in favour*, 5% to be *against*, 2% to be *very against*, 6% to be *indifferent* to adopting electronic voting already for the next provincial elections ($n=306$).

Those who tested the touchscreen were also required to provide a subjective comparative evaluation of the traditional paper-and-pencil system and of the electronic one on a set of aspects such as user-friendliness, perceived secrecy, facility for interpretation of electors' will, proneness to vote tallying *et al.* The results show a preference for electronic voting regardless of sex, age, education and declared level of participation in elections. Consistently with the outcomes of the *pre-hoc* survey, favour towards electronic voting increases with level of education and participation and decreases with age, whereas paper-and-pencil balloting does not show any clear-cut trend related to these variables.

6 Conclusions

All through this paper we attempted to stress that studying social feasibility is a central issue in introducing such a substantial transformation as electronic voting. The impact of this innovation in a setting traditionally governed by symbolic and material customs is a very delicate matter that can be faced efficaciously only through the active involvement of all stakeholders: policy-makers, technologists, but above all citizens. We suggested a model of action research aimed at facilitating the switch from paper-and-pencil to electronic ballot, though further study is needed to provide a comprehensive assessment of the social impact. The results we presented suggest that citizens in the province of Trento are ready to accept the challenge but they need to be adequately supported by a communication campaign tailored to the needs of each social group. It is also important that more trials are conducted to help people get used to the new system before it is granted legal standing: only by "going local" and by listening to citizens it is possible to develop a voting machine truly compatible with their expectations and skills.

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